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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/750,933	12/30/2003	Sachin Doshi	884.A60US1	1886
21186	7590	04/06/2006	EXAMINER	
SCHWEGMAN, LUNDBERG, WOESSNER & KLUTH 121 S. 8TH STREET SUITE 1600 MINNEAPOLIS, MN 55402			SCHLIE, PAUL W	
			ART UNIT	PAPER NUMBER
			2186	

DATE MAILED: 04/06/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/750,933	Applicant(s) DOSHI ET AL.	
	Examiner Paul W. Schlie	Art Unit 2186	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 March 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2 and 4-23 is/are pending in the application.
- 4a) Of the above claim(s) 3 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-2, 4-23 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 March 2006 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. Claims 1-2 and 4-23 have been examined, with claims 1, 4-5, 8, 15, 20 being amended, and claim 3 being withdrawn.

Response to Arguments

2. Applicant's arguments filed 3/21/06 have been fully considered but they are not persuasive.

As with respect to the objection to the drawings, although it is true that logically disconnected regions labeled "L1", "132", etc. are depicted; the drawings are absent any diagrammatic representation a functional composition a FIFO composed of memory segments (i.e. the linked list elements themselves composed of an array of data and/or pointer elements themselves pointing to subsequent linked list elements functionally composing said FIFO) associated with port links as implicitly claimed and as deemed essential to the understanding of the same; thereby essentially showing the linked FIFO list formed presumably rooted in port links LL1/L1... within region 144, to the list elements composed of memory segments comprising pointer/array elements within region 148; or alternatively LL1/LL2 being link-list elements, with link LL1/L1 within region 144 pointing to a memory segment within 148, and LL1/L2 pointing to LL2 within which LL2/L1 points to a different memory segment within 144. The objection has been correspondingly clarified.

As with respect to the rejection of claims 1, 8, 15, and 20 (and correspondingly dependant claims), with respect to Heddes in view of that cited by the examiner being "does not teach explicitly that more than one pointer to queued data may compose each

Art Unit: 2186

buffer record, thereby utilizing an unrolled linked-list in lieu of a simple linked list of records ...” the examiner has clarified the rejection to more clearly and properly read as intended now being “but does not explicitly teach that in lieu of each simple linked list datum element pointing to a buffer record, said buffer record may be logically merged with said linked-list element thereby effectively utilizing an unrolled linked list element comprising a multi-element buffer (or pointer) record (as both have nearly equivalent memory utilization efficiencies, although slightly different allocation and/or control benefits/tradeoffs as known by those of ordinary skill in the art); ...”, as is considered to be clearly taught by Appel in a form consistent with the criteria necessary to support their obvious combination with that taught by Heddes; as specifically, Appel discloses within the abstract of the reference “We present a data structure for unrolled-lists, where each cell has several data items (car fields) and one link (cdr). This reduces the memory used for links, and it significantly shortens the length of control-dependence and data dependence chains in the operations on lists”, being distinct although utilized by that correspondingly disclosed “We further present an efficient compile-time analysis that transforms programs written for ordinary lists into programs on unrolled lists”, as cited by the applicant as the basis of the invalidity of obviousness to combine is clearly not relevant as the data structure and its benefits are taught independently of its potential other uses. Where in further view that such an unrolled-list structure retains the fundamental linking structure relied upon within simple linked lists to compose an elastic FIFO as taught by Heddes, the motivation to combine that taught by Appel with that taught by Heddes with anticipation of success to improve the potential access

Art Unit: 2186

efficiency of a linked-list FIFO implementation is considered fully and properly substantiated (although note that this combination may not be required if the applicant has more accurately intended that which is explicitly taught by Heddes as implied by paragraph [0011] within the detailed description of the disclosure). Further, as each list element is logically equivalent to that claimed as being composed within "memory segments", and being themselves the resources utilized to formulate logical FIFO's, all corresponding claims are considered as being correspondingly taught and/or obvious to one of ordinary skill in the art at the time of the claimed invention.

With respect to dependent claims 10-11 and 18 being based on the disclosed formulas; as the formulas merely represent factual (i.e. innate) characteristics of such a data structure as taught by Appel, who has also quantified it's benefit regarding it's use in table 1 of that reference albeit in different form; and in further view that the derivation of the formula presented by the applicant utilized to formulate table 1 within the disclosure appears to be substantially arbitrary (as the formulas and corresponding entries within the table do not appear to correspond to some minimally supported queue depth as would be expected as being a principle constraint/requirement for any FIFO implementation; as for any given sized FIFO [i.e. capable of queuing some minimum number of bits] such an implementation as disclosed utilizing increasingly deeper unrolled elements per utilized element will consistently have both a decreasing worst-case efficiency [i.e. $\text{min_utilized_data_bits} / \text{total_allocated_bits}$], and increasing best-case efficiency [i.e. $\text{max_utilized_data_bits} / \text{total_allocated_bits}$], thereby the optimal selection would seem to be more a function of the a system's tolerance for the worst-

case inefficiency vs. the benefit of a greater best-case efficiency for a given sized unrolled list element); all corresponding limitations are considered largely subjective design choices based on inherent characteristics of said implementation, thereby not patentably distinguishable over prior art.

Drawings

3. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature and structural detail essential for a proper understanding of the disclosed invention as claimed. Therefore, details of the linked list FOFO data structure must be shown or corresponding features canceled from the claims. No new matter may be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheets should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the drawing changes are not accepted by

Art Unit: 2186

the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1B. 5. Claims ^{1-2 and}4-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Heddes et al. (5,432,908) in further in view of Appel et al. ("Unrolling Lists" LISP 6/94).

As per independent claims 1, 8, 15 and 20, Heddes et al. teaches a communication system comprising the method and/or means to enable a logical communications port to be associated with a logical FIFO composed of a linked-list of pointers to buffer records both composed of a plurality of memory locations, allocated themselves from a linked list of such available records, such that multiple said FIFO's may be dynamically allocated and sized to accommodate a plurality of such ports as may be required, from an otherwise commonly accessible pool of memory (see figure 3, abstract, and column 3 lines 20-57); but does not explicitly teach that in lieu of each simple linked list datum element pointing to a buffer record, said buffer record may be logically merged with said linked-list element thereby effectively utilizing an unrolled linked list element comprising a multi-element buffer (or pointer) record (as both have nearly equivalent memory utilization efficiencies, although slightly different allocation

Art Unit: 2186

and/or control benefits/tradeoffs as known by those of ordinary skill in the art); however Appel et al. teaches an unrolled linked list data structure which may be successfully utilized to accomplish this (see abstract paragraphs 2-3). Thereby it would have been obvious to one of ordinary skill in the art at the time of the claimed invention, to combine the use of a single data/pointer linked-list FIFO implementation as taught by Heddes et al. with the knowledge that such an implementation may be unrolled into a multiple data/pointer linked-list as taught by Appel et al, for the benefit of potentially improving the effective utilization and/or access efficiency of such a logical FIFO data structure.

As per claims ³~~4~~ 7, 9-14, 16-19 and 21-23, being dependant on claim 1, 8, 15, 20 or correspondingly dependent claim inclusively, all limitations associated with the allocation, sizing, and/or utilization a conventional unrolled linked-list data structure as the basis of an implementation of a conventional logical FIFO (or its numerical analysis) as disclosed, are considered inherent and/or obvious design choices to one of ordinary skill in the art at the time of the disclosed invention. Any potentially remaining claimed limitations not otherwise more explicitly addressed are considered corresponding obviously inherent in that taught, tangential to the disclosed invention, and/or not sufficient to patentably distinguish over prior art. [As an aside, as disclosed, although not seemingly claimed, Walpole et al. 2003/0236904 discloses the recognition that such an unrolled linked-list buffer record may be treated as an inherent circular list of pointers, who's logical index may be decremented until reaching the embedded link being effectively positioned at index 0 (see page 13 column 2 paragraph 0226).]

Conclusion

Art Unit: 2186

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Paul W. Schlie whose telephone number is 571-272-6765. The examiner can normally be reached on Mon-Thu 8:00-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Kim can be reached on 517-272-4182. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


PIERRE BATAILLE
PRIMARY EXAMINER
4/2/06